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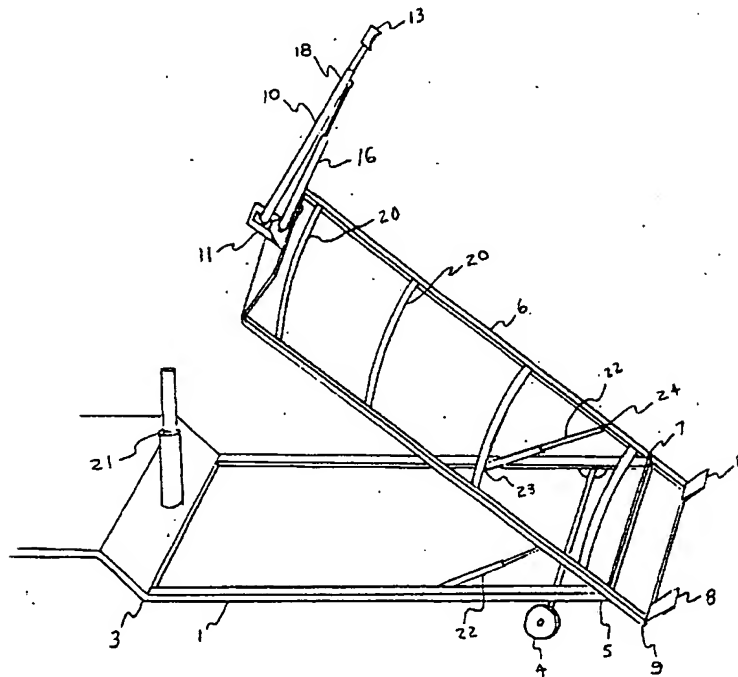
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(72) MACDONALD, Murray, CA
(71) MACDONALD, Murray, CA
(51) Int.Cl.⁶ B60P 1/04, B60P 1/28, B62D 63/08
(54) **REMORQUE POUR TRANSPORTER UN RESERVOIR**
(54) **TRAILER FOR TRANSPORTING TANKS**



(57) A trailer for moving large oblong objects, which objects are normally oriented so that the longer length is oriented vertically, notably as in oil storage tanks located at well sites. The trailer comprises a load bed which tips into a vertical position adjacent the object. When the load bed is in the vertical position, the rear end of the load bed contacts the ground and lift plates attached to the rear end of the load bed extend along the ground. The trailer is then backed up against the object and the lift plates slide under the object. One or more arms are activated to clamp the object against the bed, allowing it to be lowered with the bed to a horizontal position for transport.



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VEHICLE FOR TRANSPORTING TANKS

This invention deals with the field of vehicles for transporting large objects and in particular for
15 the picking up, transportation and repositioning of large, vertically oriented oblong objects such
as oil storage tanks.

BACKGROUND:

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Storage tanks are required at operating oil well sites which are not connected to pipe lines.
These tanks are most often cylindrical and rest on one flat end next to the well. They are very
large, often being over 30 feet high and 15 feet in diameter.

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Normal oil field operations require that these tanks often be moved from one location to another. Present methods for transporting them are slow and hazardous for the personnel involved. A load bed is raised to a vertical position adjacent to the tank and the tank is then secured to the load bed by chains or straps at the top and bottom. This involves climbing to the top of the tank, often some 30 feet in the air, to secure chains. Not only is the climb hazardous, but often the top of the tank is rusted from exposure to the elements and thereby weakened, making walking on the top dangerous as well.

- 10 In some areas safety authorities do not allow persons to climb on the tanks to secure chains, requiring instead that a picker truck accompany the trailer truck to raise a person safely to the top to secure the chains.

The present procedure is time consuming as well as hazardous.

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SUMMARY OF THE INVENTION:

- It is the object of the present invention to provide a vehicle suited for picking up, transporting and repositioning large, vertically oriented oblong objects such as oil storage tanks that allows the job to be done much quicker and more safely than is presently possible.

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The invention accomplishes this object providing a self-loading trailer for picking up, transporting and placing into position large, oblong objects which are normally oriented so that the longer dimension is vertical, said trailer comprising a horizontal frame having hitch means attached at the front end of said frame and wheels supporting the rear end of said frame; a load bed resting on said frame and pivotally attached to the rear end of said frame, the rear end of the load bed extending rearward of the rear end of said frame, the pivotal attachment such that the load bed may be rotated into a vertical position about the pivot point; a lift plate attached to the rear end of the load bed so that when the load bed is in the vertical position the lift plate contacts the ground and extends along the ground, perpendicular to the load bed; at least one load arm pivotally attached to the load bed such that the load arm may be activated to clamp the object to moved to the load bed; lifting means to raise and lower the load bed; and activation means to activate the load arm.

15 DESCRIPTION OF THE DRAWINGS:

While the invention is claimed in the concluding portions hereof, preferred embodiments are provided in the accompanying detailed description which may be best understood in conjunction with the accompanying diagrams where like parts in each of the several diagrams are labeled with like numbers, and where:

Figure 1 is a perspective view of the embodiment, with the bed in a partially raised position;

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Figure 2 is a plane side view of the embodiment, with the bed in the lowered position;

Figure 3 is a plane side view of the embodiment, with the bed in the raised vertical position;

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DETAILED DESCRIPTION OF THE INVENTION:

- 10 The invention provides a self-loading trailer for picking up, transporting and placing into position large, oblong objects which are normally oriented so that the longer dimension is vertical, said trailer comprising a horizontal frame having hitch means attached at the front end of said frame and wheels supporting the rear end of said frame; a load bed resting on said frame and pivotally attached to the rear end of said frame, the rear end of the load bed extending rearward of the rear end of said frame, the pivotal attachment such that the load bed may be rotated into a vertical position about the pivot point; a lift plate attached to the rear end of the load bed so that when the load bed is in the vertical position the lift plate contacts the ground and extends along the ground, perpendicular to the load bed; at least one load arm pivotally attached to the load bed such that the load arm may be activated to clamp the object to moved to the load bed; lifting means to raise and lower the load bed; and activation means to activate the load arm.
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Figures 1, 2 and 3 show a preferred embodiment of the invention, designed for use in transporting vertically oriented cylindrical tanks. Horizontal frame 1 includes a hitch 2 attached at the front end 3 of the horizontal frame 1 and wheels 4 supporting the rear end 5 of the horizontal frame 1; a load bed 6 rests on the horizontal frame 1 and is pivotally attached to the rear end 5 of the horizontal frame 1 at load bed hinges 7. Cradle members 20 are curved to approximately match the circumference of the tank 15 to be moved, and form the bottom of the load bed 6. Lift plates 8 are attached to the rear end 9 of the load bed 6.

The load arm in this embodiment is a hydraulically activated load cylinder 10 that is pivotally attached to the load bed tower 11 at load cylinder pivot point 12. Fixed to the end of the load cylinder 10 is load clamp plate 13. A second hydraulically activated cylinder, the swing cylinder 16, is pivotally attached to the load bed tower 11 at swing cylinder pivot point 17, and pivotally attached to the barrel 18 of the load cylinder 10 at barrel pivot point 19. It is contemplated that load arms could be mounted to pivot from the sides to clamp the load, and those skilled in the art will recognize that still further modifications could be made which would fall within the scope of the invention.

Hydraulically activated starter lift cylinder 21 is fixed to the horizontal frame 1, and extends vertically to contact, when activated, the bottom of the load bed tower 11. Hydraulically activated final lift cylinders 22 are pivotally attached to the horizontal frame 1 at frame pivot points 23 and pivotally attached to the load bed 10 at bed pivot points 24.

All hydraulically activated cylinders, being the load cylinder 10, the swing cylinder 16, the starter lift cylinder 21 and the final lift cylinders 22, are conventionally powered and controlled by hydraulic pumps and valves connected by hydraulic fluid lines, none of which are shown in the drawings.

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In operation, the trailer is backed up to a tank 15 to be moved. Starter lift cylinder 21 is fully extended, raising the load bed 6 from the horizontal frame 1, pivoting about load bed hinge 7. Then final lift cylinders 22 are extended, raising the load bed 6 into the vertical position as shown in Figure 2. As the load bed 6 pivots about the load bed hinge 7, the rear end of the load bed 6 contacts the ground 25, and when the load bed 6 reaches the vertical position, the weight of the trailer rests on the rear end of the load bed 6 and the lift plates 8. Depending on the suspension of the trailer, the wheels 4 may be raised off the ground 25. At this point, the trailer is backed against the tank 15. The lift plates 8 slide along the ground 25 and under the tank 15. Load cylinder 10 and swing cylinder 16 are activated to bring the load clamp plate 13 into contact with the upper end of the tank 15, which thereby exerts a force on the tank 15 in the direction of the load bed 6, and holds the tank in position against the load bed 6.

Final lift cylinders 22 are then retracted, lowering the load bed 6 and the tank 15 held by the load clamp plate 13, to rest on the fully extended starter lift cylinder 21. Starter lift cylinder 21 is then retracted, lowering the load bed 6 to rest on the horizontal frame 1. As the load bed 6 pivots down about load bed hinge 7, the weight of the trailer is transferred to the horizontal frame 1, and wheels 4 return to rest on the ground 25. The load bed 6 and tank 15 are then secured to the horizontal frame by chains or other conventional means prior to transport.

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This it can be seen that the invention accomplishes all of its stated objectives. The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous changes and modifications will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all such suitable changes or modifications in structure or operation which may be resorted to are intended to fall within the scope of the claimed invention.

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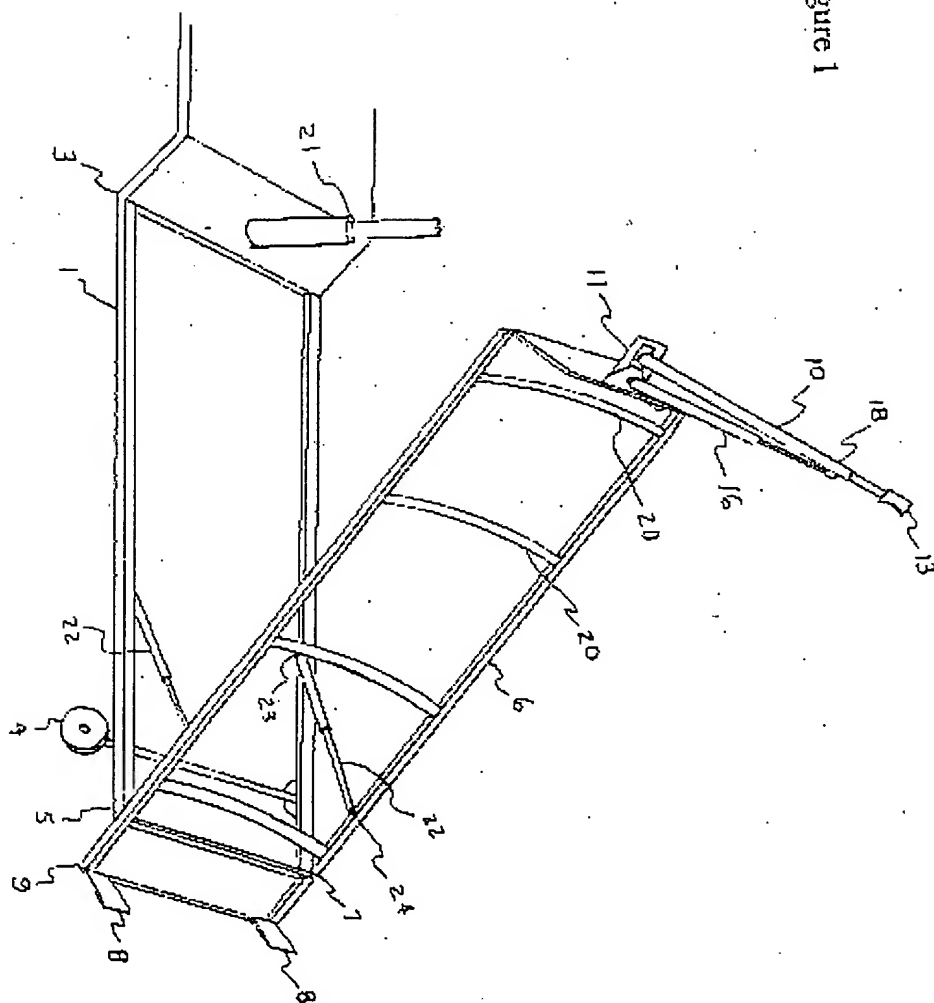
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LISTING OF DIAGRAM REFERENCE NUMERALS:

- | | |
|---------------------------------------|---------------------------------|
| 1. horizontal frame; | 13. load clamp plate; |
| 2. hitch; | 14. tank; |
| 3. front end of the horizontal frame; | 15. swing cylinder; |
| 4. wheels; | 16. swing cylinder pivot point; |
| 5. rear end of the horizontal frame; | 17. barrel of the arm cylinder; |
| 6. load bed; | 18. barrel pivot point; |
| 7. load bed hinge; | 19. cradle members; |
| 8. lift plates; | 20. starter lift cylinder; |
| 9. rear end of the load bed; | 21. final lift cylinders; |
| 10. arm cylinder; | 22. frame pivot points; |
| 11. load bed tower; | 23. bed pivot points; |
| 12. arm cylinder pivot point; | 24. ground. |

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Figure 1



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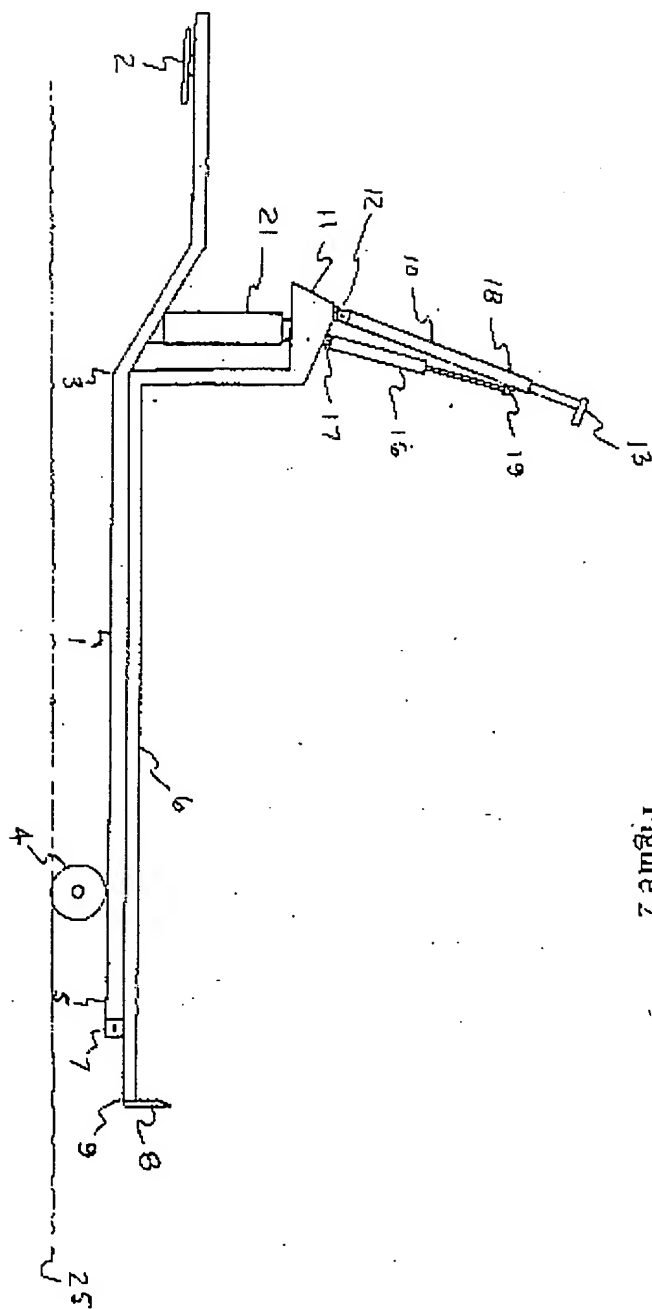


Figure 2

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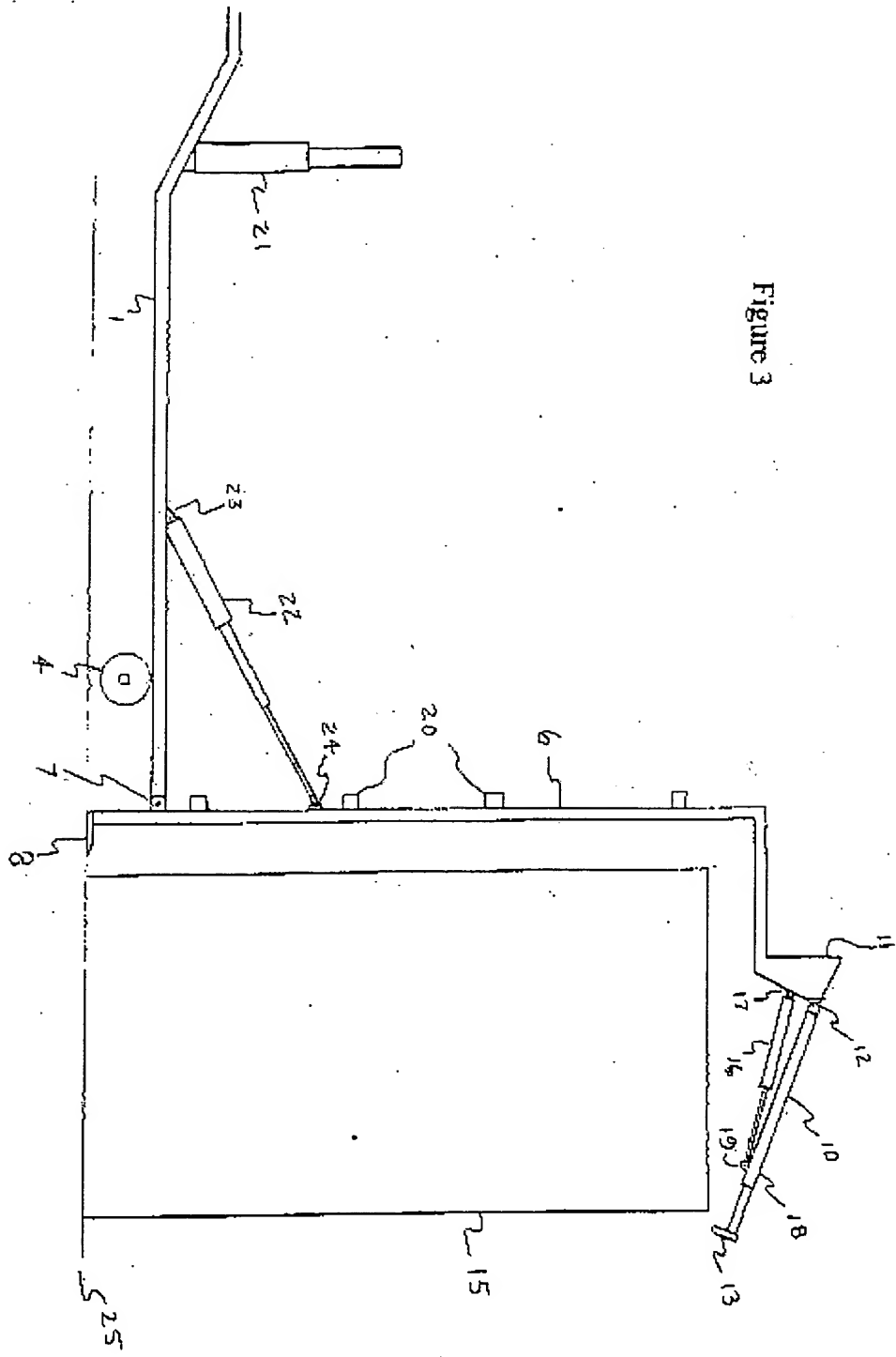
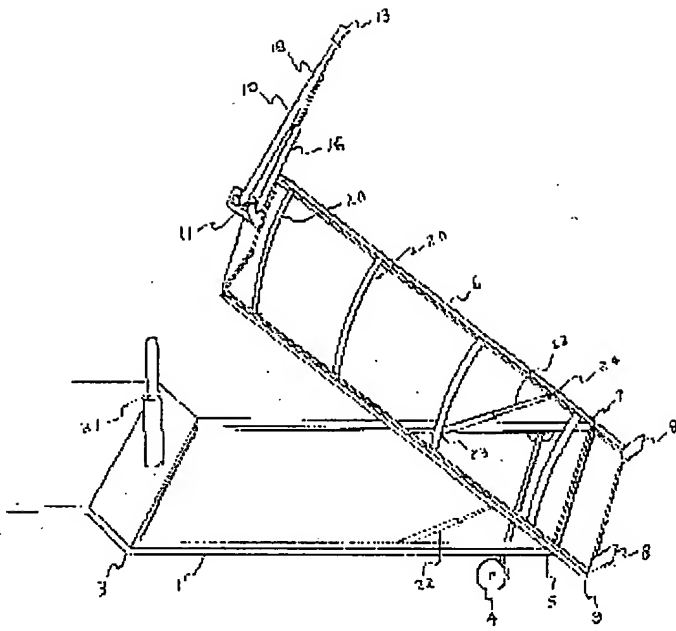


Figure 3



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CLAIMS:

I claim:

1. A self-loading trailer for picking up, transporting and placing into position large, oblong objects which are normally oriented so that the longer dimension is vertical, the trailer comprising:

a horizontal frame having hitch means attached at the front end of the frame and wheels supporting the rear end of the frame;

a load bed resting on the frame and pivotally attached to the rear end of the frame, the rear end of the load bed extending rearward of the rear end of the frame, the pivotal attachment such that the load bed may be rotated into a vertical position about the pivot point and such that when the load bed is in the vertical position, the rear end of the load bed contacts the ground;

at least one lift plate attached to the rear end of the load bed such that when the load bed is in the vertical position the lift plate contacts the ground and extends along the ground, perpendicular to the load bed;

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at least one load arm pivotally attached to the load bed such that the load arm may be activated to clamp the object to be moved to the load bed;

lifting means to raise and lower the load bed; and

activation means to activate the load arm.

2. The invention of Claim 1 wherein the load bed is shaped to conform to the shape of the object to be moved.
3. The invention of Claim 1 wherein the activation means to activate the load arm is at least one hydraulically activated cylinder.
4. The invention of Claim 3 wherein the hydraulically activated cylinder is mounted on a raised tower at the front end of the load bed.
5. The invention of Claim 1 wherein the load arm comprises a hydraulically activated arm cylinder pivotally attached to a first point on the load bed, the arm cylinder comprising a load clamping plate at the load engaging end thereof.
6. The invention of Claim 5 further comprising a hydraulically activated swing cylinder pivotally attached to a second point on the load bed, which swing cylinder acts to pivot the arm cylinder about the first point on the load bed and force the load clamping plate

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against the object to be moved in the direction of the load bed, thereby clamping the object to be moved to the load bed.

7. The invention of Claim 6 wherein the first and second pivot points for the hydraulically activated arm and swing cylinders are located on a raised tower at the front end of the load bed.
8. The invention of Claim 7 wherein the lifting means to raise and lower the load bed includes at least one hydraulically activated lift cylinder.
9. The invention of Claim 2 wherein the load arm comprises a hydraulically activated arm cylinder pivotally attached to a first point on the load bed, the arm cylinder comprising a load clamping plate at the load engaging end thereof.
10. The invention of Claim 9 further comprising a hydraulically activated swing cylinder pivotally attached to a second point on the load bed which swing cylinder acts to pivot the arm cylinder about the first point on the load bed and force the load clamping plate against the object to be moved in the direction of the load bed, thereby clamping the object to be moved to the load bed.
11. The invention of Claim 10 wherein the first and second pivot points for the hydraulically activated arm and swing cylinders are located on a raised tower at the front end of the load bed.

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12. The invention of Claim 11 wherein the lifting means to raise and lower the load bed includes at least one hydraulically activated lift cylinder.